

passage from the wet air outlet 21 of the humidifier 3 to the wet air inlet 22 of the fuel cell 1 is closed while the passage from the wet air outlet 21 to the exhaust opening 17 is opened, and further, the second three-way valve 5 is controlled in such a way that the passage from the wet out-air outlet 23 of the fuel cell 1 to the wet out-air inlet 24 of the humidifier 3 is closed while the passage from the sweep piping 9 to the wet out-air inlet 24 is opened.

When the system is in the condition described above and the motor in the supercharger 2 is turned on, dry air Ad is inhaled from the intake opening 11 into the air piping 7.

The dry air Ad exiting from the supercharger 2 is divided into dry air Ad1 that enters into the humidifier 3 through the air piping 7 without any change, and dry air Ad2 flows into the sweep piping 9 and enters into the humidifier 3 through the second three-way valve 5.

The dry air Ad1 flows through the dry air passage in the humidifier 3 and exits from the humidifier 3, and is discharged from the exhaust opening 17 through the first three-way valve 4 and the discharge piping 18. The dry air Ad2 flows through the wet out-air passage (discharge gas passage) in the humidifier 3 and, after exiting from the humidifier 3, is discharged from the exhaust opening 14 through the pressure adjusting valve 16.

As described above, according to this embodiment of the fuel cell humidifying system, when it is anticipated according to outside temperature that freezing of the humidifier 3 may take place, the dry air Ad exiting from the supercharger 2 is directed, before freezing takes place, to the dry air passage and wet out-air passage inside the humidifier 3, and therefore, residual moisture which causes freezing is swept from the dry air passage and wet out-air passage to prevent the humidifier 3 from freezing.

Second Embodiment

Fig. 3 shows a schematic diagram of the flow of gas in the normal mode of operation of the fuel cell humidifying system in the second embodiment, and Fig. 4 shows a configuration of the system operating in the reverse flow cleansing mode.

In the diagrams, a reference numeral 31 relates to a first reverse cleansing piping, 32 to a second reverse cleansing piping, 33 to a first exhaust piping, 34 to a second exhaust piping and 35 to a pressure sensor. The parts that are the same as those in Figs. 1 and 2 are given the same reference numbers.

The overall system configuration and the normal mode of operation of the fuel cell humidifying system will be explained with reference to Fig. 3.